

REMARKS

The Advisory Action mailed August 11, 2008, has been received and its contents carefully studied. Claims 16-19 were pending and rejected. Claims 16-19 have been amended for clarification. No statutory new matter has been added. Support for all claim amendments can be found in the disclosure.

Rejections Under 35 USC 103(a)

Claims 16-19 all stand rejected as purportedly unpatentable over Jeng et al (US 5,282,925) in view of Song et al (US 2004/0161890) and further in view of Demmin et al (US 6,635,185). The rejections as to claims 16-19 is traversed. Applicants courteously solicit withdrawal and reconsideration in view of the amended claims and arguments presented herein.

Claims 16-19, as amended, emphasize that the chemical oxide film, removed by Applicants' methods, is formed as a protective film "after" the removal of a natural oxide film previously existing on the workpiece. One of Applicants' objectives is to safeguard the wafer by inhibiting the formation of further natural oxides, such as SiO₂, after removal of the first natural oxide. Reformation of natural oxide films on a wafer is prevented by subjecting the wafer to a chemical process using a solution (i.e., H₂O₂ and NH₄OH). This forms the protective chemical oxide film (SiO₂ film) on the wafer. Ultimately, the chemical oxide film itself must be removed from the wafer via HF and NH₃ prior to transmittal of the wafer to another system for further processing.

The Office Action asserts that it would have been obvious to one of ordinary skill in the art to have combined Jeng in view of Song in view of Demmin *at the time the invention was made* to arrive at Applicants' claimed invention methods. This assertion of obviousness, however, untenably is based upon hindsight. According to Applicants, their claimed invention solves a problem that itself was exceedingly difficult to discover. In the past, there was no great demand that the chemical oxide film thickness be very small. It was not recognized that a small ratio of the chemical oxide film thickness, L, to the thickness of the gate oxide film could cause unfavorable affects in prior art devices. It was only through the efforts of very advanced research, in advanced technology, that Applicants discovered the problem that their claimed

methods now solve. Applicants refer to their Fig. 2 and emphasize that the thickness, L , of the chemical oxide film 4 now is very small, in the range of about 0.7 to about 0.9 nm. In their specification, Applicants explain the problem as

“Although the chemical oxide film 4 has the very small thickness L in the range of about 0.7 to about 0.9 nm, the ratio of the thickness L of the chemical oxide film to the thickness of the gate oxide film, namely, the sum of the respective thicknesses of the chemical oxide film 4 and the thermal oxide film 6, increases when the desired thickness of the gate oxide film is in the range of about 1.0 to about 1.2 nm. The control of the thickness of such a gate oxide film is difficult. Such a problem resides not only in forming the gate oxide film, but also in forming various kinds of thin film. The chemical oxide film may be removed by the film removing method using HF gas as mentioned in Patent document 1. However, a process singly using HF gas needs to be carried out at a room temperature. It takes much time to change the temperature of a processing vessel, namely, a vertical furnace, having a large heat capacity in a wide temperature range, which reduces throughput greatly.”

Applicants are confident that those of ordinary skill in the art would never have derived their particular method steps from prior art such as the Dennis patent. Their recited method steps are much more than design matters. They are directed to solving the problems discussed hereinabove. None of the cited art, namely Jeng, Song, and Dennis recognizes the problems addressed by Applicants' method steps. As such, it courteously is urged that none of the cited art could teach or suggest such steps. Applicants' claimed method steps increase throughput. In view of the foregoing, Applicants respectfully submit that claims 16-19, as amended, are patentably distinguishable over the cited prior art. As such, Applicants courteously request withdrawal and reconsideration of the rejection to claims 16-19, as amended.

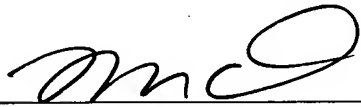
CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Therefore it is respectfully requested that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for all allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. However, in the event that additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. 1.136(a), and any fees required therefore are hereby authorized to be charged to Deposit Account No. 02-4300, Attorney Docket No. 033082 M 275.

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP

By: 
Michael A. Makuch, Reg. No. 32,263
1130 Connecticut Ave., N.W., Suite 1130
Washington, D.C. 20036
Telephone: (202) 263-4300
Facsimile: (202) 263-4329

Dated: October 21, 2008